

H5-08

2. Using the **graphical method**, compute and sketch $y[n] = h[n]*x[n]$ for

(a) $x[n] = \delta[n] - \delta[n-3]$, $h[n] = 3\delta[n+1] - 3\delta[n-3]$

(b) $x[n] = \begin{cases} 1, & 0 \leq n \leq 3 \\ 0, & \text{else} \end{cases}$, $h[n] = \begin{cases} 1, & 1 \leq n \leq 3, 7 \leq n \leq 9 \\ 0, & \text{else} \end{cases}$

(c) $x[n] = e^n (u[n] - u[n-2])$, $h[n] = e^{-n} u[n]$

(i) $x[n] = u[n-1] - u[n-4]$, $h[n] = (-1)^n u[n]$

3. Using the **analytical method**, compute and sketch $y[n] = h[n]*x[n]$ for the following signals, where α and β are distinct real numbers.

(a) $x[n] = \alpha^n u[n]$, $h[n] = \beta^n u[n]$

(b) $x[n] = \alpha^n$, $h[n] = \beta^n u[-n]$ (What additional assumption on α and β is needed?)

7. Suppose $y[n] = (x * h)[n]$. For each of the pairs of signals given below, show how

$\hat{y}[n] = (\hat{x} * \hat{h})[n]$ is related to $y[n]$.

(a) $\hat{x}[n] = x[n-3]$, $\hat{h}[n] = h[n+3]$

(b) $\hat{x}[n] = x[n-3]$, $\hat{h}[n] = h[n-3]$

(c) $\hat{x}[n] = x[-n]$, $\hat{h}[n] = h[-n]$

(d) $\hat{x}[n] = x[-1-n]$, $\hat{h}[n] = h[1-n]$